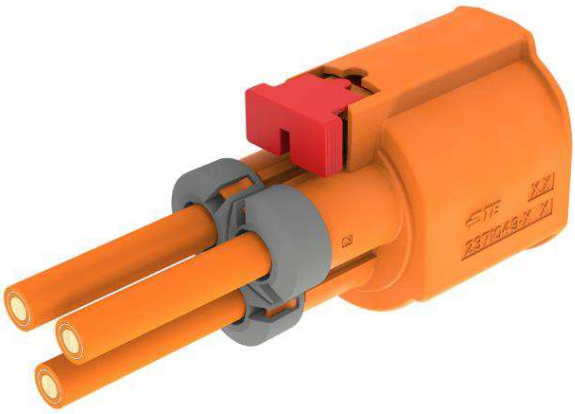
HVA HD400 2POS & 3POS 180DEG PCB HEADER PRODUCTION SPECIFICATION

HVA HD400 两位&三位高压连接器 产品规范



				PR: H.PENG DATE:06APR2023	Shanghai, China		
				CHK: J.LI DATE:06APR2023			
A1	Revise	H.P	06DEC2023	APP:Z.ZHOU DATE:06APR2023	Document No.: 108-160777	LOC: ES	REV: A1
LTR	REVISION RECORD	PR	DATE				

CONTENT

1. SCOPE 适用范围

1.1 Content 内容

TE Connectivity's touch-proof 2&3 position connector HVA HD400 and header are designed to meet LV215 specifications, for a metric wire size range from 2.5mm² up to 6mm2 acc. to LV216-2.
With a 180° cable outlet incorporates the sealed connector system two 4mm Power contacts and an integrated High Voltage Interlock (HVIL) System. The HVA HD400 connector is available for 6 different keying or polarizing configurations and incorporates 360° conductive EMI shields to reduce radiated emissions in the application. The housings are molded in orange to denote a high voltage system.
泰科电子的两位&三位防触摸连接器 HVA HD400 公母端，设计符合 LV215 标准，适用符合 LV216-2 的公制 2.4mm²到 6mm²的电缆,
密封连接系统采用 180°出线，两路或三路 4mm 电源连接和一个高压互锁系统。HVA HD400 连接器有六种不同的键位，并采用 360 度导电 EMI 屏蔽以减少应用中的辐射。外壳体采用橙色警示色代表高压系统。

This specification covers the performance, test and quality requirements for TE Connectivity 2&3 position connector HVA HD400 Plug and header assembly. (hereinafter referred to as HVA HD400).

本规范适用于泰科电子 HVA HD400 两位&三位高压连接器公母端(以下简称 HVA HD400) 的性能，测试和质量要求。

1.2 Qualification 鉴定

When tests are performed, the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

本测试规范依照下面的规范及标准执行。所有的检验应依照合适的检验计划及产品图纸执行。

2. APPLICABLE DOCUMENTS 适用文件

2.1 Usable document 使用文件

In the event of conflict between the requirements of this specification and the drawing, the drawing shall take precedent.
In the event of conflict between the requirement of this specification and the referenced documents, this specification shall take precedent.

在本规范的要求与图纸发生冲突时，以产品图纸为准。在本规范的要求与参考文件发生冲突时，以本规范为准。

2.2 TE specifications 泰科电子规范

TEC-109-1: General requirements for Test Specifications / 测试通用规范

2.3 Customer drawings

Table 1: Customer drawings / 客户图纸

Header side (Include interface) / 公端(包括应用面板)	
2413900	HD400 180DEG PCB HEADER ASSY
2413902	HD400 180DEG HEADER PCB COVER
1719102	PCB 6.3 TERMINAL

1670208	MQS 1.5 TERMINAL

Plug side / 母端	
2371035	2POS & 3POS,4MM, PLUG HSG, ASSY, SEALED
2349177	DIA. 4MM SOCKET TERMINAL
2371242	INNER FERRULE
2371243	OUTER FERRULE
2371244	SINGLE WIRE SEAL
2371245	CABLE CLIP

2.4 Specifications 规范

Table 2: TE-specifications / 泰科规范

Specifications	**Description**
108-32306	Product Specification 4MM contact system
108-160784	Product specification PCB DIA4MM contact system
108-94129	Product specification PCB contact system 6.3
108-18782	Product Specification MCON1.2 Contact system
108-160777	Product specification HVA-HD400 2POS & 3POS 180DEG PCB connector
114-160038	Application Specification 4MM contact system
114-18464	Application Specification MCON1.2 Contact system
114-160093	Application Specification HVA HD400 2POS & 3POS Plug
114-160465	Application specification HVA-HD400 2POS & 3POS 180DEG PCB header
114-18910	Application specification PCB contact system 6.3

2.5 Other Specifications 其他规范

Table 3: Other Specifications

Doc number	Edition	Standard: Title, Author
DIN EN 60664-1	2008-01	Isolation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
DIN 40050-9	1993-05	Degrees of protection (IP-Code) - Protection of electrical equipment against foreign objects, water and access
ISO 20653	2006-08	Road vehicles – Degrees of protection (IP Code) - Protection of electrical equipment against foreign objects, water and access
ISO 6469-3	2001-01	Electric road vehicles – Safety specifications. Part 3: Protection of person against electric hazards
SAE J 1742	1998-03 (2005-12)	Connections for High Voltage On-Board Road Vehicle, Electrical Wiring Harnesses Test Methods and General Performance Requirements
LV 214-1	2010-03	Test specification for motor vehicle connectors
LV 215-1	2009-02	Electrical/Electronic Requirements of HV Connectors
VW80332	2017-09	Motor Vehicle High-Voltage Contacts
LV216		HV shield cable

3. REQUIREMENT 要求

3.1 Design and Construction 设计和结构

Products must meet the design, construction and physical dimensions specified in the applicable product drawings.

产品必须满足产品图纸上的设计，结构和尺寸要求。

3.2 Material 材料

Description of the material sees the related customer drawings.

材料描述见相关客户图纸。

3.3 Test parameters and tolerances 测试参数与公差

Table 4: Test parameters and tolerances

Requirement 要求	Tolerance 公差
Ambient temperature 环境温度	23°C ± 5°C
Relative humidity 相对湿度	45% to 75%
Atmospheric pressure 大气压力	100kPa ± 10kPa

3.4 Ratings 等级

Table 5: Product Ratings / 产品等级

Description	Range
Max. Voltage according DIN EN 60664-1	≤1000V DC
Voltage class acc. ISO 6469-3	B
Dielectric withstand voltage acc. VW80302	3000V AC 4800V DC
Insulation resistance acc. ISO 6469-3, SAE J 1742	>200MΩ
Isolation Group I acc. DIN EN 60664-1	600≤CTI
Pollution degree acc. DIN EN 60664-1	2
Ambient temperature	-40°C to 140°C
Degrees of protection (IP-Code) against access acc. ISO 20653	IPXXB
Degrees of protection (IP-Code) against foreign objects and water acc. ISO 20653	IPX9K, IP67
Color of plastic housing	Orange Similar RAL 2003
Durability mating cycle	≤50

3.5 General Performance and Test description 通用性能和试验描述

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in table 6 and table 7. All tests must be performed at the test condition of the TE test specification TEC-109-1 unless otherwise specified.

产品应能满足表 6 和表 7 中的电气，机械和环境等性能要求。所有试验均需按照 TE 规范 TEC-109-1 中的测试条件进行，除非另有说明。

3.6 Tests requirement and procedures summary 测试要求及方法

Not shown test-details see LV 214 (2010-03), LV215-2 (2013-03), VW80332 (2019-01)

Table 6: Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
PG0 RECEIVING INSPECTION		
E 0.1 Visual inspection	Basic function proven	LV215-2 DIN EN 60512-1-1
E 0.2 Contact resistance	Contact (total resistance including crimp connection): ● HV Terminal ≤ 0.68mΩ (Plug-Header 6mm²) ● HV Terminal ≤ 1.27mΩ (Plug-PCB 6mm²) ● Shield– aggregate ≤ 10mΩ; ● HVIL ≤ 15mΩ	LV215-2 DIN EN 60512-1-1
E 0.3 Insulation resistance	Insulation resistance after testing ● Every HV potential to each other ● Every HV potential to shielding ● Every HV potential to HVIL R>200MΩ at V=1000V DC, T=60s ● Shielding to HVIL R>100MΩ at V=500V DC, T=60s	LV215-2 DIN EN 60512-3-1
E 0.4 Dielectric strength	Test duration of 60 seconds at 3kV AC: leakage current < 10 mA ● Every HV potential to each other ● Every HV potential to shielding ● Every HV potential to HVIL	LV215-2 SAE J1742
PG 4 CONTACT OVERLAPPING		
E 4.1 Contact engagement length	Values see appendix 5.3	Theoretical study
PG 5 Mechanical and thermal relaxation behavior		
L 5.1 Inserted and extracted 5 times before further loading	No damage during inserted and extracted circle	LV215-2
L 5.2 Aging in dry heat 100h	Shield resistances after testing: Shielding cable – aggregate < 10mΩ	LV215-2 DIN EN 60512-1-1
PG7 HANDING AND FUNCTIONAL RELIABILITY OF THE HOUSINGS		
E 7.4 Insertion force or actuation force for insertion and extraction aids	Insertion and extraction force: ≤ 75N	LV215-2 DIN EN 60512-15-6
PG 8 MATING AND RETENTION FORCE OF CONTACT PARTS		
E 8.2 Contact holding force from the housing	HV terminal pin > 80N HVIL terminal > 50N	LV214 USCAR-2 5.7.1

PG 13 HOUSING INFLUENCE ON THE DERATING		
E 13.2 Derating with housing	Dependent on application and cable type different values are possible Max. temperature at contacts 150°C Derating see appendix 5.1	LV215-2 DIN EN 60512-5-1/2
DYNAMIC LOADING		
ISO 16750 - 3 Test IX	Monitor interruption: > 7Ω, <1us，record data Contact resistance after testing: ● HV Terminal ≤ 1.36mΩ (Plug-Header 6mm²) ● HV Terminal ≤ 2.54mΩ (Plug-PCB 6mm²) ● Shield– aggregate ≤ 10mΩ; ● HVIL ≤ 15mΩ	ISO 16750 - 3
PG18C DICING SALT LOAD		
B 18.2 Salt spray, cyclic	Resistances after salt spray test, not sealed ● HV Terminal ≤ 1.36mΩ (6mm² :Plug-Header); ● HVIL-Contact ≤ 15mΩ ● Shielding cable – aggregate <10mΩ	LV215-2 DIN EN 60068-2-52
B 23.1 Immersion with vacuum	Each pressure states -10 kPa, holding time 5 min -50 kPa, holding time 5 min	LV215-2
E 0.3 Insulation resistance	Insulation resistance after testing ● Every HV potential to each other ● Every HV potential to shielding ● Every HV potential to HVIL R>200MΩ at V=1000V DC, T=60s ● Shielding to HVIL R>100MΩ at V=500V DC, T=60s	LV215-2
PG 21 LONG-TERM AGING		
B 21.1 Long-term aging in dry heat	1000h at 140°C; Resistances after aging: ● HV Terminal ≤ 2.54mΩ (6mm² :Plug-PCB); ● HVIL-Contact ≤ 15mΩ ● Shielding cable – aggregate < 10mΩ	LV215-2 DIN EN 60068-2-2
E 8.2 Contact holding force from the housing	HVIL terminal > 50N	USCAR-2 5.7.1
PG 51 IP PROTECTION OPEN CONNECTOR		
PG51 Protection open connector	IP-Protection IPXXB, un-mated IP-Protection IPXXD, mated	ISO 20653

3.7 Additional Test Procedures and Test Results 附加的测试方法和结果

Table 7: Additional test requirements

Test Description	Requirement	Procedure
A1 The insulation part to PCB insertion and removal force	Insert to lock Force: max 60N Remove Force: min 110N	USCAR-2 5.4.5

4. QUALITY 质量

4.1 Qualification test 鉴定

Samples must be in accordance with drawings and be taken in a random way in the production in progress.

样件必须与产品图纸一致，并且是生产过程中随机选取的。

4.2 Requalification test 重新鉴定

If changes significantly affecting form, fit, or function are made to the product or to the manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by product engineering.

如果产品或者制造过程中有显著影响外观，装配和功能的设变，质保需要协调按照原先工程部定义的测试顺序，重新验证全部或者部分测试项目。

4.3 Acceptance 验收

Acceptance is based on verification that the product meets the requirements of section 3.6. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be took and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmitted.

归咎于测试设备，样件安装或者操作员的失误的失效不应判定产品不合格。当产品失效发生时，需要有纠正措施以及重新提交样件进行验证。在重新验证前，需确认已有纠正措施。

4.4 Quality conformance inspection 质量合格检验

The applicable TE Connectivity quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification

TE Connectivity 的质量检验计划将指定适用的质量标准。尺寸和功能要求，应按照适用的产品图纸和本规范。

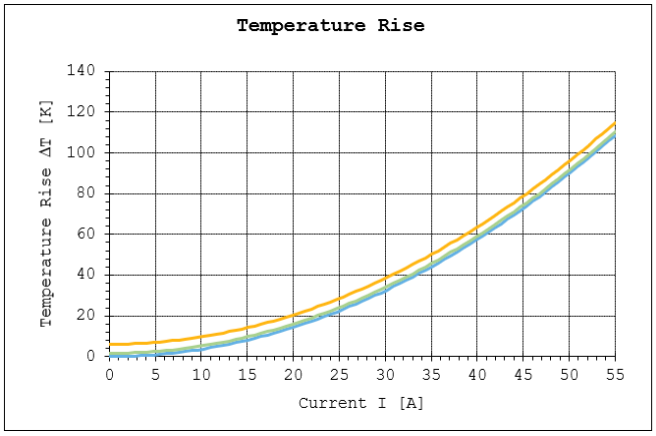
5. APPENDIX 附件

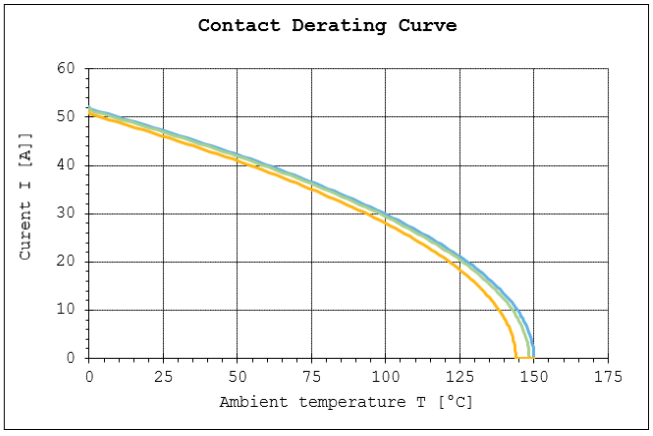
5.1 Derating inside housing 成品温升降额曲线

Derating and temperature rise, derating inside housing (80% characteristic) - Current at contact and shield:

Connector	Wire cross	Derating curve
2 Pos	2.5mm²	Curve 1
	4.0mm²	Curve 2
	6.0mm²	Curve 3
3 Pos	2.5mm²	Curve 4
	4.0mm²	Curve 5
	6.0mm²	Curve 6

Curve 1:

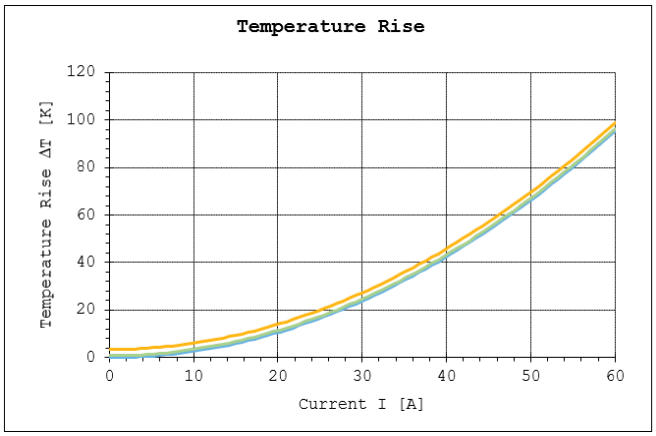


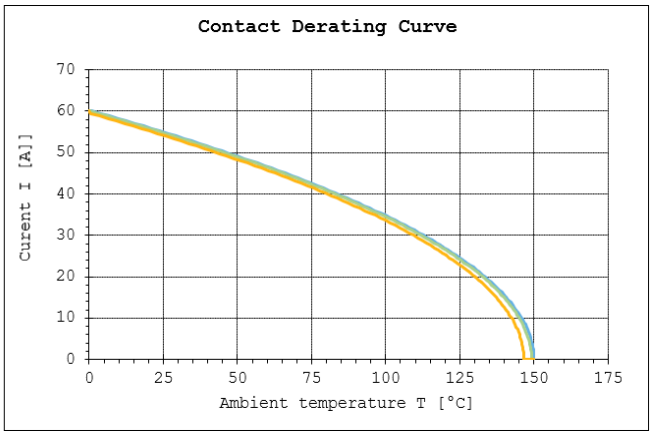


Remark: Shielding I = 0A; Shielding I = 10A; Shielding I = 20A.

Curve 1: Temperature rising and 80% characteristic derating curve _ 2 Pos connector with 2.5mm² wire

Curve 2:

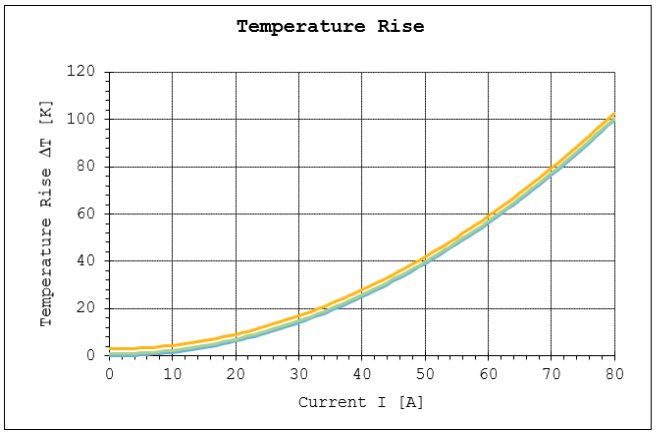


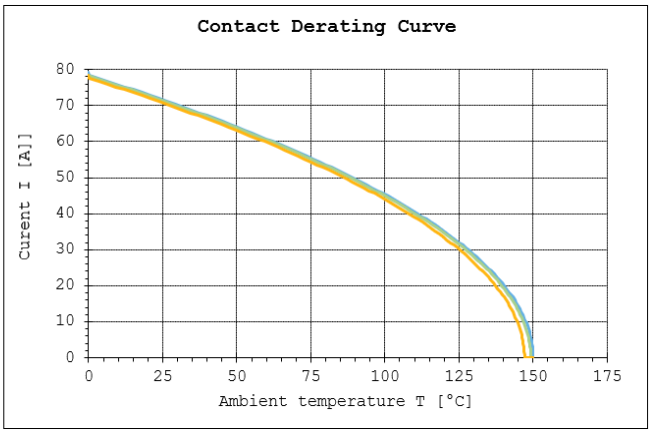


Remark: Shielding I = 0A; Shielding I = 10A; Shielding I = 20A.

Curve 2: Temperature rising and 80% characteristic derating curve _ 2 Pos connector with 4.0mm² wire

Curve 3:

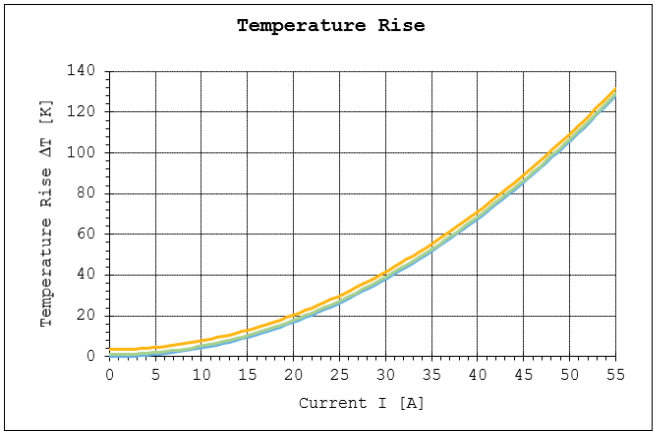


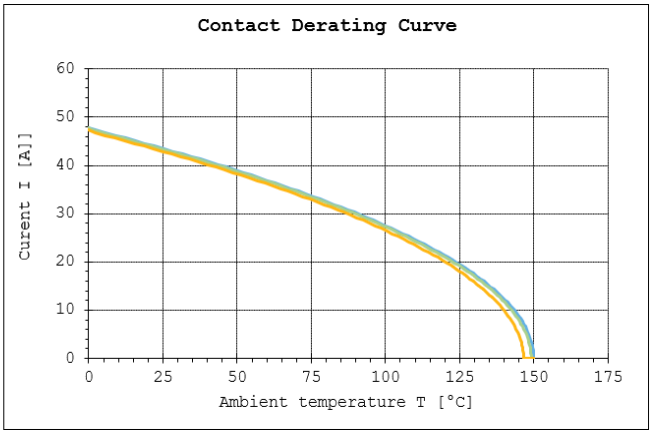


Remark: Shielding I = 0A; Shielding I = 10A; Shielding I = 20A.

Curve 3: Temperature rising and 80% characteristic derating curve _ 2 Pos connector with 6.0mm² wire

Curve 4:

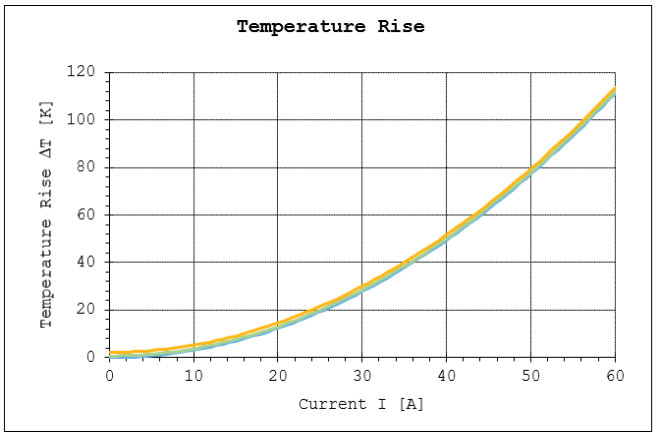


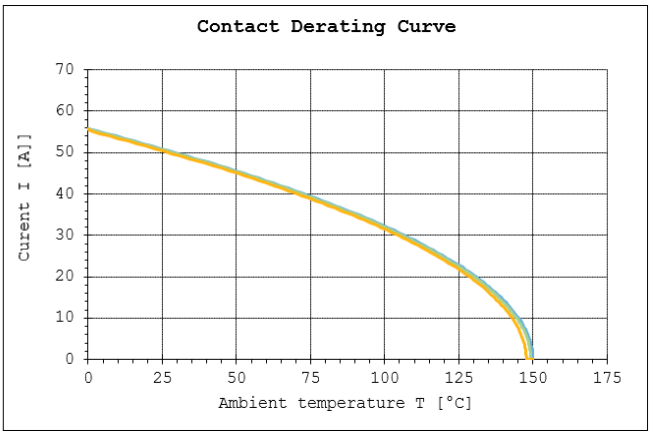


Remark: Shielding I = 0A; Shielding I = 10A; Shielding I = 20A.

Curve 4: Temperature rising and 80% characteristic derating curve _ 3 Pos connector with 2.5mm² wire

Curve 5:

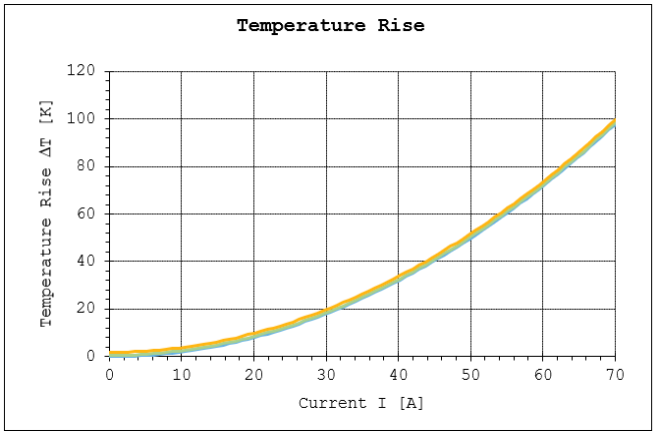


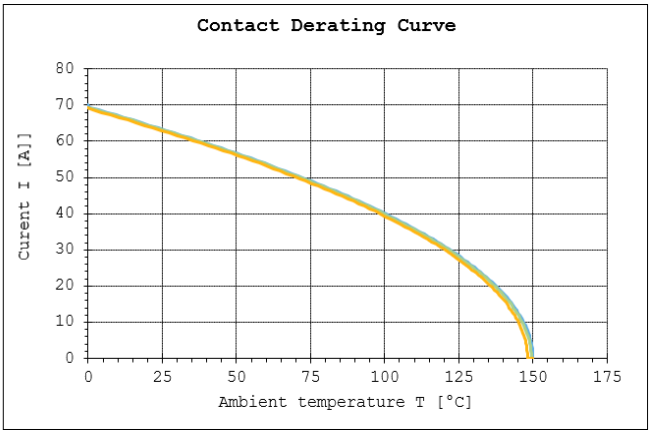


Remark: Shielding I = 0A; Shielding I = 10A; Shielding I = 20A.

Curve 5: Temperature rising and 80% characteristic derating curve _ 3 Pos connector with 4.0mm² wire

Curve 6:





Remark: Shielding I = 0A; Shielding I = 10A; Shielding I = 20A.

Curve 6: Temperature rising and 80% characteristic derating curve _ 3 Pos connector with 6.0mm² wire

5.2 Dynamic load (ISO 16750 - 3 Test IX) 振动性能 (ISO 16750 - 3 Test IX)

Dynamic load acc. ISO 16750 - 3 Test IX

Design of vibration device (see figure 2)

FORCE 6mm² shield cable, cable length 100mm

Wire fastening distance is 100mm

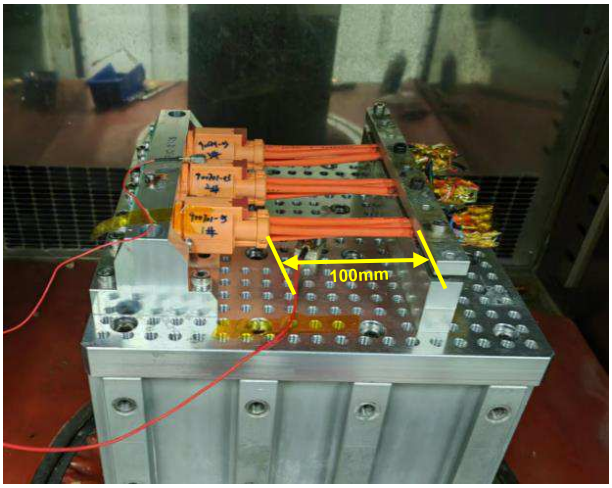


Figure 2: Vibration device setup

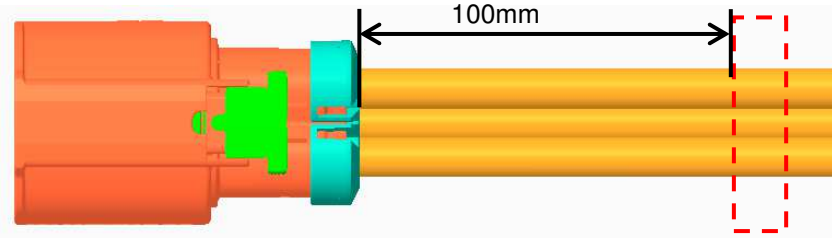
5.3 Contact engagement length 端子接触长度

A	Contact overlap – Power contact	电源端子	≥ 1mm
B	Contact overlap – HVIL contact	高压互锁端子	≥ 1mm
C	Contact overlap – Shield contact	屏蔽接触	≥ 1mm

5.4 Strain Relief 应力释放

System is validated with strain relief at 100mm. Each application has to be evaluated independently with regards to the external influences on the system. Having strain relief, which moves with the connector body, close to the end of the connector will have a positive influence on the performance of the connector. Have strain relief further from the end of the connector or that moves independent of the connector body will have a negative influence on the performance of the connectors.

系统通过 100mm 的应变消除进行验证。每个应用都必须独立评估对系统的外部影响。随连接器主体移动的压力释放，接近连接器的末端将对连接器的性能产生积极影响。应变释放离连接器的末端更远或者连接器主体晃动将对连接器的性能产生负面影响。



REV	DESCRIPTION CHANGE	RESPONSIBLE	DATE
A	INITIAL RELEASE	H.P	18MAY2022
A1	Update 5.1 Derating Curves	H.P	06DEC2023